(54) **A database system**

(57) A database system accessible by a menu-driven window comprises a memory having pages (13) arranged in different levels of an arbitrary hierarchical structure (11), and a processor which enables a window generated by a terminal to access the structure (11). The pages (13) each have frames comprising a main and secondary frames. The processor allows the window to access the frames via three different types of logical links which interconnect the pages. The primary type links a page within a level to a parent and/or child page in an adjacent and logically preceeding or succeeding level. The secondary type links the frames of a page serially. The tertiary type links one page directly to another page anywhere in the structure. The primary and tertiary links are provided between any frame of a source page and the main frame of a destination page. The main frame of a page is linked to a successive page by a primary logical link, and a secondary frame of a page is linked to a common family of pages by a tertiary logical link.

Fig. 1.
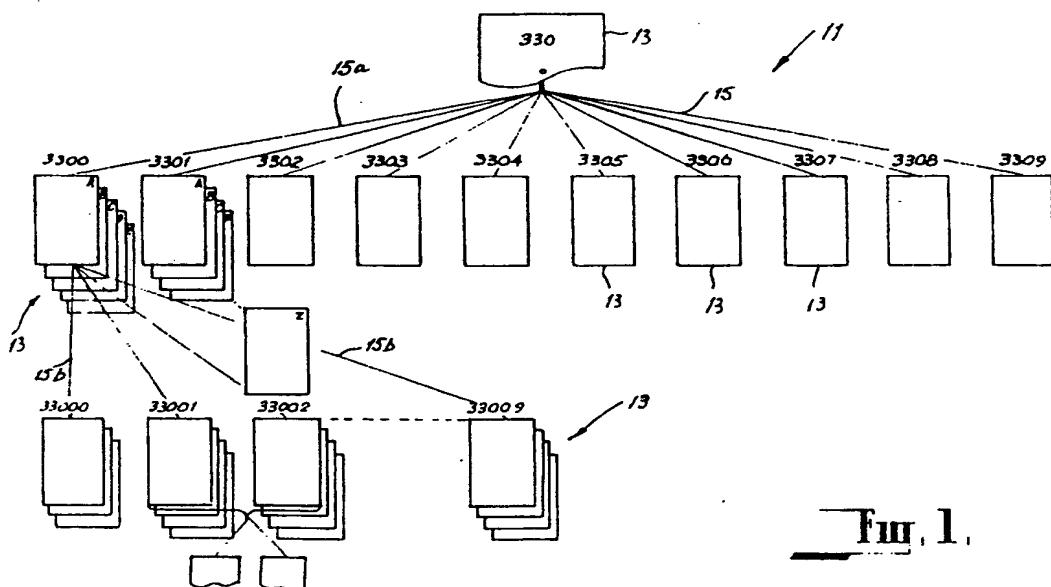
GB 2 187 580 A

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

This print embodies corrections made under Section 117(1) of the Patents Act 1977.

Fig. 1.

2187580

Fig 2

Fig. 3.

2187580

Fig. 4

2187580

330123

1000

11	21
12	22
13	23

3301231

10000

3301232

100000

33012311

IT

1
2
3

IF

1000000

IF

IT

1
2
3
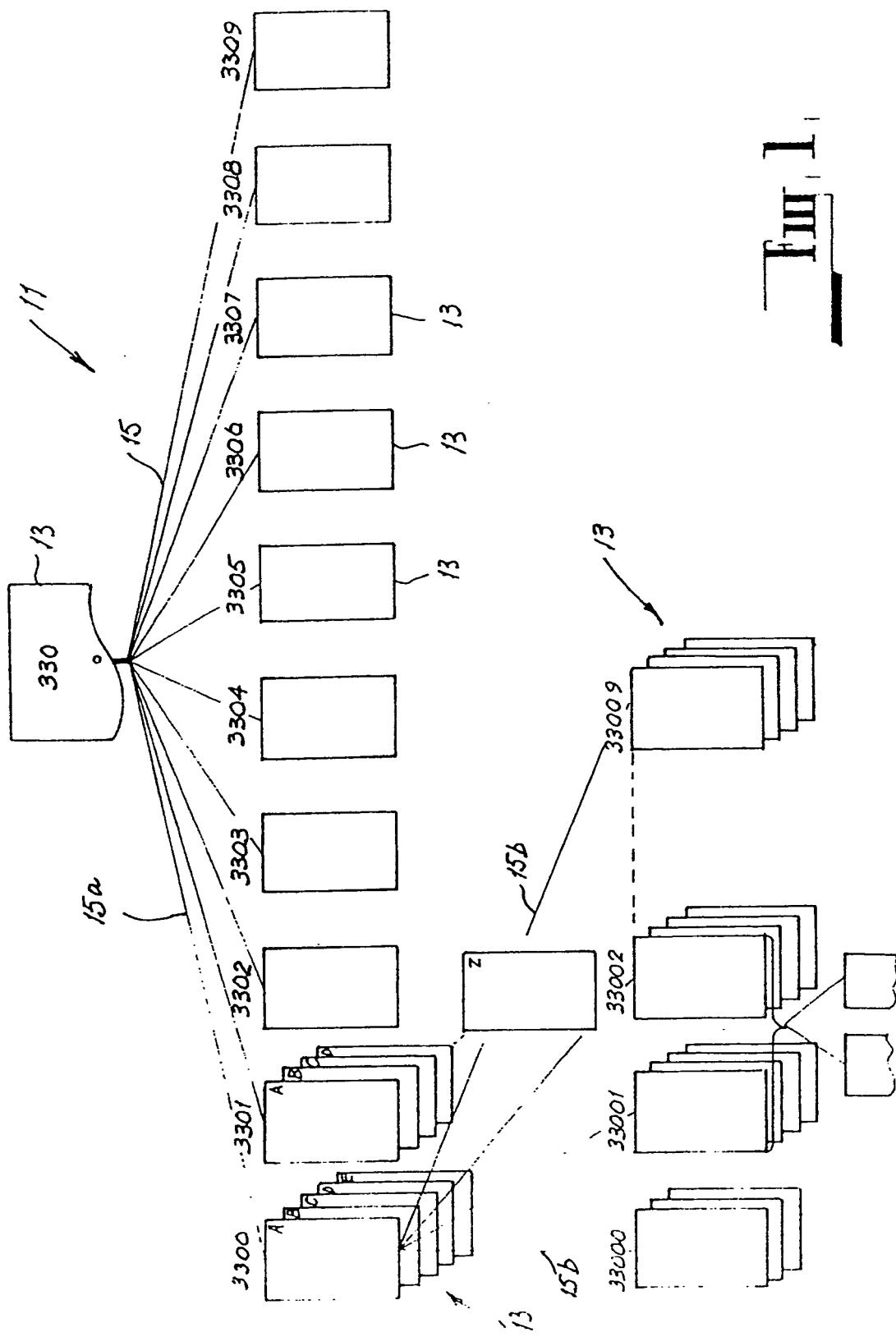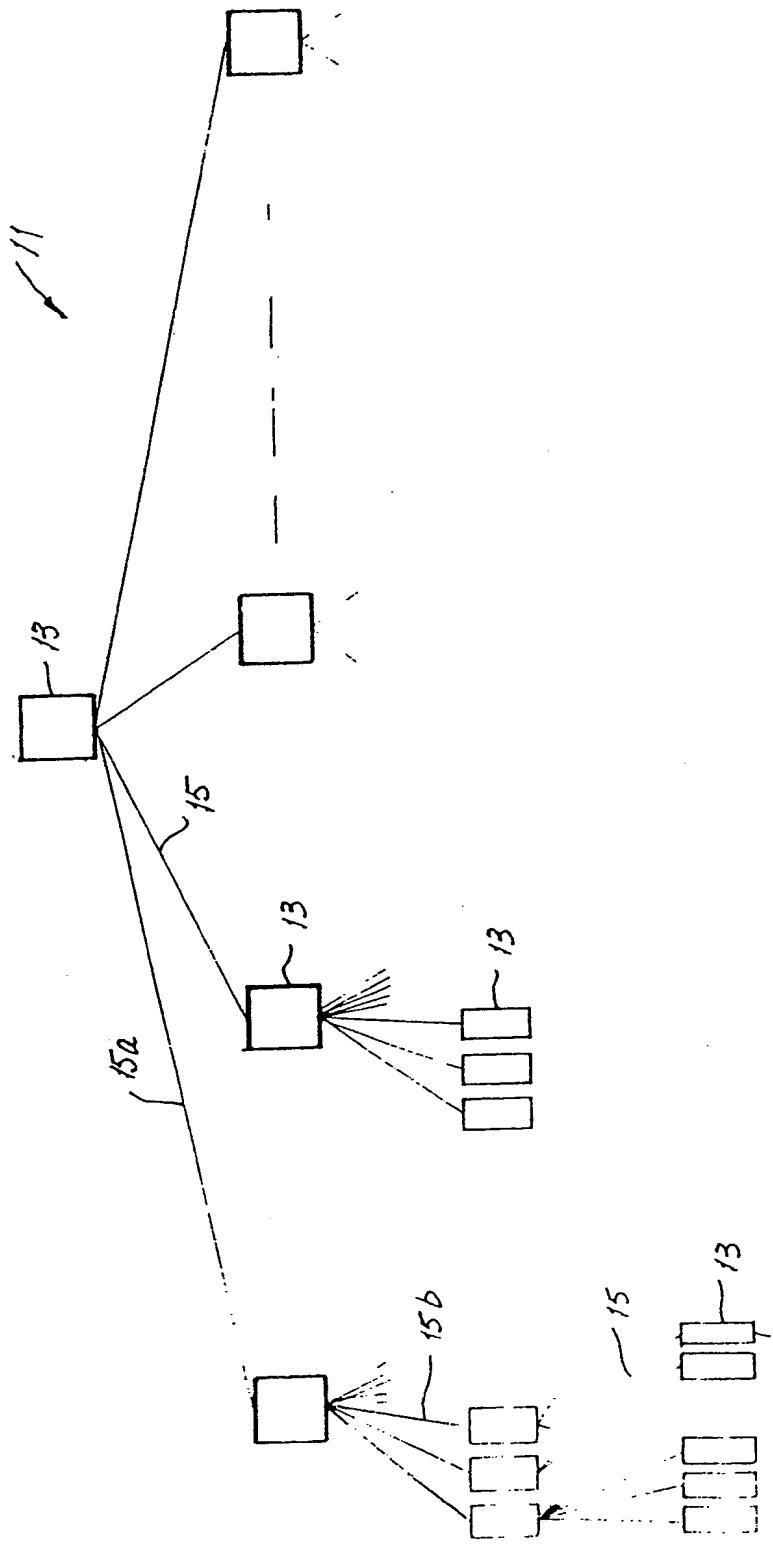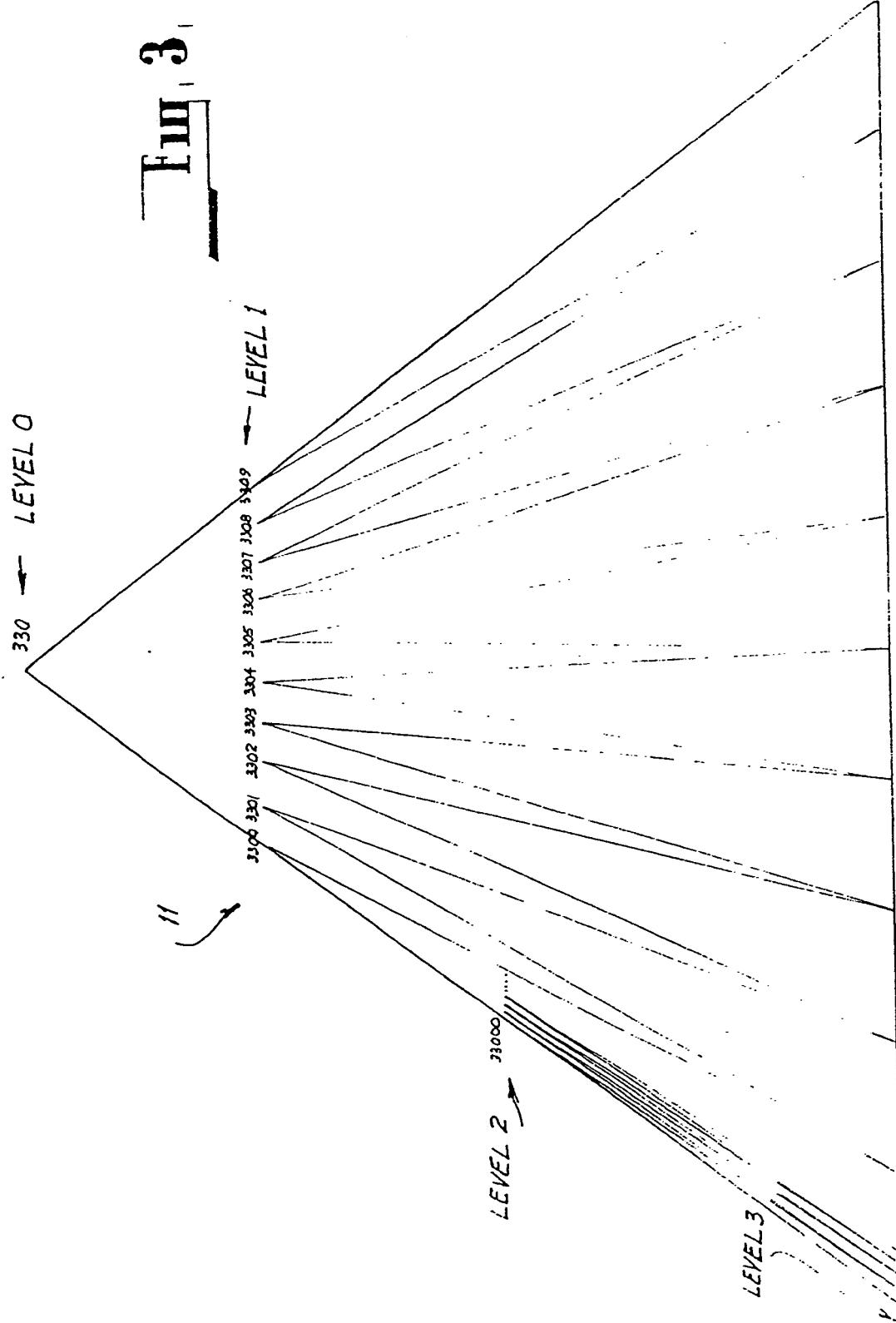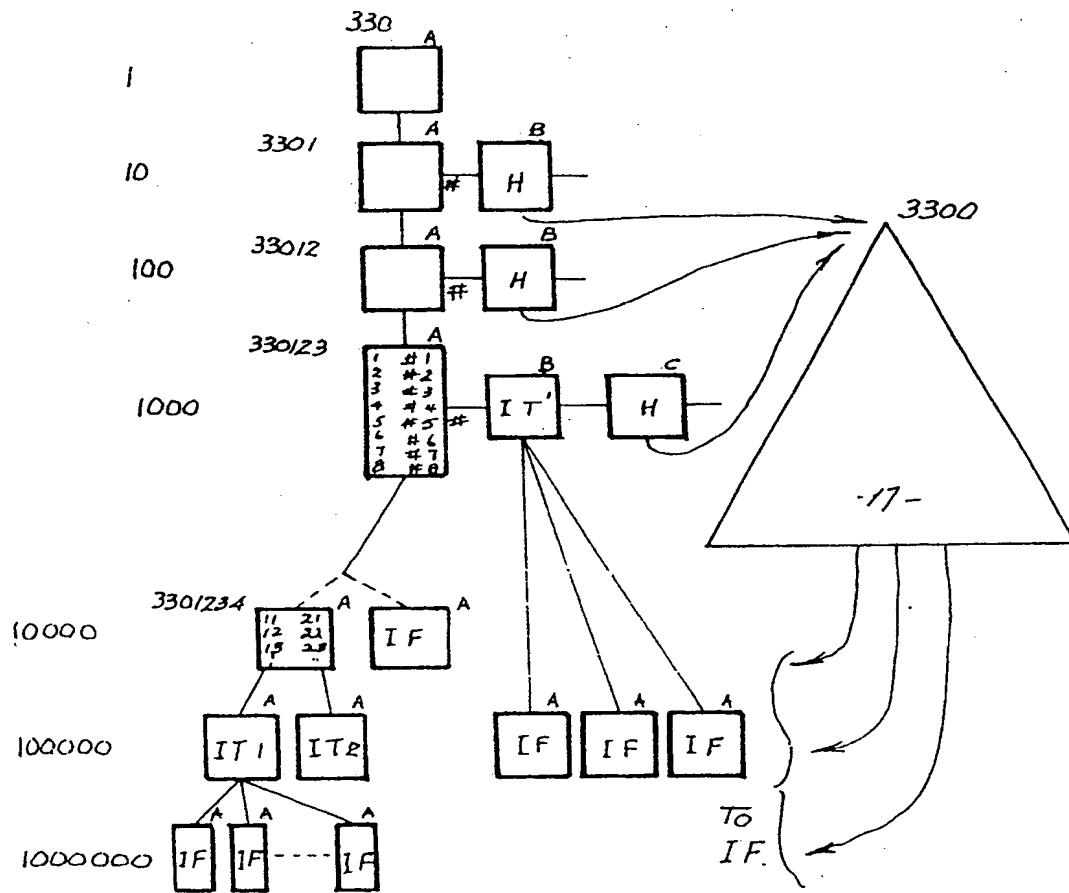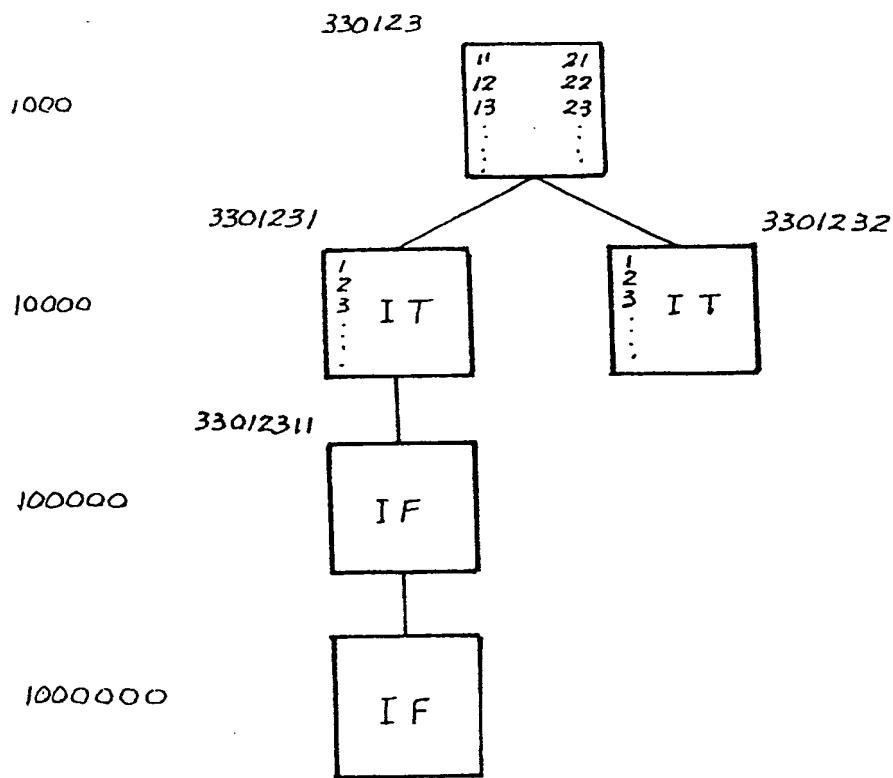
Fig. 5

SPECIFICATION

A database system

5 THIS INVENTION relates to a database system which has particular application in the implementation of a videotex system for providing information stored on the database to a user accessing the database.

10 In this specification the term page is defined to mean a unitary collection of data which may be stored within a memory medium such as is associated with a computer system and which said unitary collection of data can be

15 represented in graphical form on a display to a user of the database.

In this specification the term frame is defined to mean a sub-collection of data contained within a page, which sub-collection is

20 of a size which can be entirely represented in graphical form on a display at any one instant to a user of the database, said page being formed by a series of adjoining frames which collectively are coterminous with said page.

25 In this specification the term window is defined to mean that portion of the database which can be accessed by a user and represented in graphical form on a display at any one instant, the size of the window being one

30 frame.

In this specification, the term logical link is defined to mean the direct route which can be followed by the window from one frame to another, under the direct control of a user of

35 the database.

The logical link between frames and pages is created on implementation of the database and usually cannot be altered by an external user of the system via the window.

40 As a consequence of the popularity of databases as a medium for storing information which is accessable by a number of users at any one time to recover particular aspects of the information stored thereon, much effort

45 has gone into designing a database which is user friendly for persons accessing the same and who do not have a working knowledge of the technical aspects of the database system. Consequently, with the introduction of the vi-

50 deotex system into Australia and elsewhere, emphasis has been placed on utilising a database system implementation which is menu-driven and which comprises a vast quantity of pages on which information is stored,

55 whereby the pages are arranged in a numerical sequence and can be individually accessed by page number or by use of the menu provided on the system. The videotex system which is presently implemented on the Australian tele-

60 phone communications network for public use, is more commonly known by the trade mark "Viatel". This system allows for a number of service providers to implement their own database within the broad confines of the videotex

65 system. Accordingly, a user of the Viatel sys-

tem may individually access the database of a service provider for particular information given by the service provider.

Due to the vast amount of information
70 which is capable of being stored on the Viatel database by means of the service providers, it has become increasingly difficult for a user of a particular database to enter the database of the service provider and quickly access the
75 particular page containing the information sought. This problem has arisen mainly because of the limitations provided by the menu driven display incorporated in these databases for the purposes of maintaining user
80 friendliness in accessing the system.

Accordingly, it is an object of the present invention to provide a database system which enables a user thereof to utilise the menu-driven window accessing system simultane-
85 ously with a direct reference accessing system, whilst maintaining user friendliness.

In accordance with one aspect of the invention, there is provided a database system accessible by a menu-driven window compris-
90 ing:—

a storage means having a plurality of pages generally arranged in different levels of an arbitary hierarchical structure, some pages having a plurality of frames associated therewith,
95 one said frame of a page being a main frame and the other frame of frames of said page being a secondary frame;

a processing means to enable access to the pages and frames of said storage means by a
100 plurality of logical links selectively interconnecting said pages in sequence throughout said structures; said logical links being provided in three different forms, the first form comprising primary logical links which link a
105 page within a level to a parent page in an adjacent and logically preceding level and/or to a child page in an adjacent and logically succeeding level, the second form comprising secondary logical links which link the frames
110 of a page serially, and the third form comprising tertiary logical links which link one page directly to another page located anywhere within said structure, wherein said primary and tertiary links between successive pages are
115 provided between a frame in the source page and the main frame in the destination page;

wherein said processing means is adapted to accommodate said window so that it may selectively access said memory means and
120 progress through said structure by accessing an individual frame of a page at any one time, via said logical links; and

wherein said structure is arranged such that the main frame of a page is linked to a suc-
125 cessive page by a primary logical link and a secondary frame of a page is linked to a common family of pages by a tertiary logical link.

In accordance with another aspect of the invention, there is provided a method of ac-
130 cessing a database system as defined at the

preceding aspect of the invention using a ter-
minal means to interact with said processing
means and which may generate one of a plu-
rality of commands to create said window and
5 a tertiary logical link, and access said pages
of said structure via said logical links, said
method comprising:
addressing a page of said structure with
said window by selecting an appropriate pri-
10 mary or tertiary logical linking command with
said terminal;
progressing said window to a secondary
frame of said selected page having a tertiary
logical link to said common family of pages by
15 selecting an appropriate secondary logical link-
ing command with said terminal;
progressing said window to a root page of
said common family by selecting an appropri-
ate tertiary logical linking command with said
20 terminal;
progressing said window to a particular
page of said family by selecting an appropriate
primary logical linking command with said ter-
minal.
25 The invention will be better understood in
the light of the following description of one
specific embodiment thereof. The description
is made with reference to the accompanying
drawings, wherein:—
30 *Figure 1* is a schematic diagram of the hier-
archical structure of pages comprising the da-
tabase system;
Figure 2 is a more general schematic dia-
gram of Fig. 1;
35 *Figure 3* is a schematic diagram of a com-
plete overview of the structure shown at Figs.
1 and 2;
Figure 4 is an alternative schematic view of
the overall structure of the database; and
40 *Figure 5* is a schematic view of an undesira-
ble indexing structure at the lower levels of
the database shown at Fig. 4.
The embodiment is directed towards a data-
base system for implementation on the video-
45 tex system known under the trade mark "Via-
tel". The system is housed on a computer
having a mass storage means and processing
means and is capable of being accessed by a
plurality of terminal means.
50 In the Viatel system, every database pro-
vided by a service provider thereon comprises
a plurality of pages arranged in numerical or-
der in different levels of an arbitrary hierarchi-
cal structure which is stored on the storage
55 means. Such a structure is preferable to allow
the various pages of the database to be ac-
cessed by a manu-driven window created by
a terminal means and accommodated by the
processing means with which a user normally
60 accesses the database at the main index page
thereof and subsequently progresses down
through the database by selecting one of a
number of options provided on the index to
the user. The initial and subsequent access
65 can also be effected by the user entering the

page identifier code with the terminal directly,
if this code is known to the user. For
example, as shown at Fig. 1 of the drawings,
a user may initially access the database at
70 page 330 which is the main node of the data-
base using the identifier code 330 and pro-
gress down through other pages of the data-
base such as page 3300, then page 33000
and so on using the menu of the database.
75 In the Viatel system, each page comprises
26 frames, only one of which is individually
accessed by the user at any one time. The
first frame of a page is usually designated
"A" and subsequent frames are designated
80 with the remaining letters of the alphabet in
succession. Thus, upon initially accessing page
330, the user will in fact access frame "A" of
page 330.
By the user issuing an appropriate com-
85 mand, frame "B" of page 330 may be ac-
cessed, followed by frame "C" and so on. In
addition, by using the menu-driven window,
the first page will provide a number of op-
tions, usually 10, from which the user can
90 choose the desired option. Thus, in total, the
user has for example 10 options with which
he may jump to the "A" frame of another
page, and one further option with which he
may jump to the next frame of the page
95 which is presently accessed.
In the Viatel system, a user will normally be
accessing the database via the telephone com-
munication network to which the terminal
means, incorporating a cathode ray tube and
100 keyboard, is connected via a modem or other
suitable interfacing means. Accordingly, upon
accessing a page, the user will have displayed
to him the information appearing on the parti-
cular page frame which is accessed by the
105 window at that particular point in time. By
pressing an appropriate key on the keyboard
which corresponds to a particular option given
on the frame of information, the user's win-
dow will progress to another page provided at
110 another location within the database.
Thus on frame "A" of page 330, 10 op-
tions may be given each of which are located
at frames "A" of pages 3300 to page 3309,
respectivel. Upon the window being shifted to
115 page 3301, for example, frame "A" of page
3301 may provide a number of other options
which may progress the user's window to a
page at another level of the database. For
example, one of the options may transfer the
120 user window to page 33002, and so on. Al-
ternatively, the user may press the appropriate
command to progress the user window to the
succeeding "B" frame where he may encoun-
ter a similar array of options as were provided
125 on the "A" frame.
Another feature of Viatel, is that upon ac-
cessing any frame of a page it is only pos-
sible to transfer the window via the menu to
the "A" frame of another page and not any
130 of the other frames thereof. Accordingly, it is

common in designing database systems for
use on Viatel, to only use the "A" frame of
any page for the initial levels of the system
which are devoted solely to providing the
5 menu by which a user window may progress
down through the database. Furthermore, in
such databases it may be necessary to pro-
gress down through 6 or 7 levels before the
information sought within the database is ac-
10 tually accessed. From a users view point, ac-
cessing such a database can be extremely te-
dious, especially when a user becomes familiar
with the system and desires to seek out infor-
mation therefrom in a relatively quick period of
15 time. Although information can be directly ac-
cessed using the appropriate page identifier
code, most users would not be aware of the
particular code beforehand unless they kept a
directory of these pages. In view of the fact
20 that it is rather impractical to keep a directory
of all pages ever likely to be accessed this
technique of direct access also has its limita-
tions.
With regard to the present invention, as
25 shown at Figs. 1 and 2, the pages 13 of the
database 11 are selectively interconnected in
a logical sequence throughout the structure by
a plurality of logical links 15. As previously
discussed, each page has a plurality of
30 frames, one frame within a page being a main
frame, e.g. frame "A", and the other frames
within a page being secondary frames, e.g.
"B" to "Z".
The logical links 15 are provided in three
35 different forms. The first form comprises pri-
mary logical links 15a, more commonly known
as strict routing, which link a page within a
level to a page in an adjacent level. Moreover,
for a page at an intermediate level, a primary
40 logical link connects such a page to a parent
page in the adjacent and logically preceding
level. In addition, one or more logical links
may link the same page to a child or children
pages in an adjacent and logically succeeding
45 level. For example, as shown in the accom-
panying drawings, page 3300 is connected by
a primary logical link 15a to its parent page
330 and by a number of primary logical links
15b to its children pages 33000 to 33009.
50 The main node of the database, namely page
330, may or may not have a primary logical
link to a parent page, depending upon the
design parameters of the overall system. For
example, in Viatel, the main node of any ser-
55 vice provider database on the system, must
have a primary logical link back to page 0,
which is the main node of Viatel. Conversely,
the pages at the bottom level of the database
have no primary logical links to children
60 pages.
The second form of logical link consists of
secondary logical links which link the frames
associated with a particular page serially.
Thus, frame "A" of a page is connected to
65 frame "B" by a secondary logical link, and

frame "B" is connected to frame "C" by the
same and so on. In order to access these
secondary frames by means of the user win-
dow, it is necessary to press the command
70 key provided in the keyboard specifically for
this function, which command is not of the
type provided for following the menu of the
system.
The third form of logical link consists of a
75 tertiary logical link, more commonly known as
free routing, which connects one page directly
to another page, wherein the other page may
be located anywhere in the system. This terti-
ary logical link may be sourced from any
80 frame of a page and is always destined for
the "A" frame of the page to which it is
linked. These tertiary logical links can be de-
signed into the database in a permanent man-
ner initially and/or can be independently
85 created of a transient nature by the user ter-
minal using identifer codes for pages to be
accessed.
In arranging the database in accordance with
the present invention, the main frame of every
90 page is linked to a successive page by at
least one primary logical link, thereby enabling
the user window to progress through the da-
tabase in accordance with a menu provided
on the main frame of each page. In addition,
95 and importantly, one of the secondary frames
and preferably the "B" frame of each page is
linked to a common family of pages, the root
page of which is the same for all "B" frames
of the database. For convenience, a portion of
100 the database is permanently set aside from
the remainder of the database to locate the
said common family of pages.
In the present embodiment use is made of a
pair of successive pages in the same level to
105 define the root pages for the common family
of pages. These root pages, in effect, form
intermediary pages which can direct the win-
dow by means of primary logical links to any
of the multitude of children pages located in
110 the succeeding levels of the family. By adopt-
ing dual intermediary pages, the number of
pages in the common family which may be
sourced to every "B" frame within a distance
of two logical links, is double that which may
115 be derived from a single intermediary frame.
Moreover, when the user window is located
on any "A" frame within the database, and
the user wishes to access the common family
of pages to hasten progress through the data-
120 base, the "B" frame may be accessed by
pressing the appropriate command on the key-
board, progressing the user window via a sec-
ondary logical link to the "B" frame. The cor-
responding "B" frame may contain a common
125 index of options provided within the common
family. Such options may be double the num-
ber usually provided on the "A" frame of a
page and may be accessed by keying two
digits on the keyboard rather than one. The
130 first digit pressed will always be routed to

one or the other intermediary pages defining
the root pages of the common family. Thus,
on pressing the first digit, the user window is
progressed to the appropriate intermediary
5 page via a tertiary logical link. Subsequently,
on pressing the second key a corresponding
child to the first selected intermediary frame
will become the destination page of the user
window and thus the user window will pro-
10 gress to this child page by means of a pri-
mary logical link.
  In practice, the first and second keys are
usually pressed in relatively quick succession,
and so the user would not usually see the
15 intermediary page.
  The destination page within the common
family, or any of its children or offspring
thereof, may contain reference information to
assist the user to locate specifically the page
20 within the database to which the user desires
access. For example, the destination pages
may contain an alphabetical index according to
subject matter, and alphabetical index accord-
ing to business name or the like, wherein each
25 entry may contain the relevant page number
required to directly access the said page or
alternatively enable linkage to the said page by
means of another tertiary logical link.
  Fig. 4 provides a schematic view indicating
30 the general structure of the database wherein
all "B" frames contain help in information H
and are linked by tertiary logical links to the
common family of pages 17, root node of
which may be page 3300, for example. This
35 common family of pages 17 may contain an
extensive, cross-referenced index whereby re-
levant index-entries specifying page identifier
codes may be accessed by primary logical
links, which in turn, may be linked by tertiary
40 logical links, either permanent or transient,
back to the relevant page containing the
sought information within the main body of
the database.
  Thus a user may rapidly seek out the parti-
45 cular page within the database to which ac-
cess is ultimately required by progressing
along a minimum number of primary logical
links and utilising tertiary logical links to the
common family of pages for reference and
50 subsequently direct access to the particular
page sought.
  Having regard to another aspect of the pre-
sent embodiment, which utilises a common
family of pages to achieve a slightly different
55 effect, reference is made to Figs. 4 and 5 of
the drawings, where seven levels are provided
within the service provider database.
  It is usually necessary to maximise the infor-
mation storage capacity of the database by
60 reducing the number of primary logical links
between "A" frames of pages devoted to the
menu-driven indexing system. This becomes
particularly critical towards the lower levels of
the database where the total number of pages
65 within a level increases dramatically, and thus

many pages can be lost on a level if the level
has been devoted to further break-down of
the menu-driven index.
  For example, at level 1000, only three lower
70 levels are available for providing information to
the user. If the index at this level needs to be
broken further, as shown at Fig. 5, then only
one family of pages commencing at level
10000 and extending over two lower levels,
75 would be available for information. As previ-
ously described, to increase the size of the
family laterally, a dual index would normally be
provided at level 1000 utilising intermediary
pages IT at level 10000 to effectively provide
80 two families of pages commencing at level
100000 and extending over one lower level
for information. This is a slightly better propo-
sition than with not utilising the dual indexing
system.
85   However, by utilising the tecnique of ac-
cessing a secondary frame by a secondary
logical link and subsequently progressing the
user window down to the relevant information
level IF by tertiary logical links, in a dual page
90 indexing system, an additional level of pages
may be preserved within the system for infor-
mation.
  This is better illustrated by reference to Fig.
4, where at level 1000 of the database, it is
95 necessary to break the menu-driven index fur-
ther. Thus, the dual page indexing system is
adopted, where the "A" frame of page
330123 is provided with two columns of op-
tions, rather than a single column. Therefore
100 20 options rather than 10 can be provided.
However, rather than utilising two intermediary
pages IT1 and IT2 both of which are located
at the next level by primary logical links, the
second coloumn of options is linked by a sec-
105 ondary logical link to the "B" frame of page
330123, and so forms an intermediary frame
IT' on the same level as the dual index page,
i.e. level 1000.
  For example, the first column of options
110 may be numbered 0 to 9 which connect the
"A" frame of page 330123 via primary logical
links to the "A" frames of pages 3301230 to
3301239, respectively, which are at level
10000. The second column of options, how-
115 ever, contains two symbols. The first symbol
being the command for progressing the user
window to the adjacent frame via a secondary
logical link, e.g. #, and the second symbol
being a digit from 0 to 9. Thus on pressing #,
120 the user window would jump to the "B"
frame of page 330123, and on pressing the
next digit, the user window would jump to the.
relevant destination page.
  For example, the "B" frame of page
125 330123 would be connected by tertiary logi-
cal links to pages at level 100000. Thus two
families of pages are obtained by using the
dual indexing system, and importantly, the last
level, vis. 1000000, is preserved for further
130 use.

Furthermore, the first column of options
provided at level 1000 can either link to infor-
mation at level 10000 or can link to a further
dual index at level 10000, the latter providing
5 access to information at the last level, vis.
level 1000000.
Accordingly, the method of accessing the
secondary frame of a page of a secondary
digital link as a means of lateral expansion of
10 the index provides a powerful tool in maximis-
ing the efficient use of the database.
It should be appreciated that the provision
of tertiary logical links is a significant advan-
tage over databases only having provision for
15 primary and secondary logical links in which
progress through the database can only be
made by utilising the menu or having prior
knowledge of the precise page number which
is sought.
20 Furthermore, by adopting a consistent ap-
proach to the layout of the database whereby
all "A" frames are linked to successive pages
by primary logical links and all "B" frames are
linked to the intermediary pages of the com-
25 mon family of pages by tertiary logical links,
not only is the efficiency in accessing the da-
tabase greatly improved, but also the design
of database for use in the videotex system is
greatly facilitated.
30 It should be appreciated that the scope of
the present invention is not limited to the
scope of the particular embodiment herein de-
scribed. In particular the invention is not lim-
ited to the implementation of a database on
35 the Viatel or videotex systems but may find
utility in other forms of database contained
within different environments such as Prestel
(RTM).

40 CLAIMS
1. A database system accessible by a
menu-driven window, comprising:—
a storage means having a plurality of pages
generally arranged in different levels of an ar-
45 bitary hierarchical structure, some pages hav-
ing a plurality of frames associated therewith,
one said frame of a page being a main frame
and the other frame or frames of said page
being a secondary frame;
50 a processing means to enable access to the
pages and frames of said storate means by a
plurality of logical links selectively intercon-
necting said pages in sequence throughout
said structures; said logical links being pro-
55 vided in three different forms, the first form
comprising primary logical links which link a
page within a level to a parent page in an
adjacent and logically preceding level and/or
to a child page in an adjacent and logically
60 succeeding level, the second form comprising
secondary logical links which link the frames
of a page serially, and the third form compris-
ing tertiary logical links which link one page
directly to another page located anywhere
65 within said structure, wherein said primary and

tertiary links between successive pages are
provided between a frame in the source page
and the main frame in the destination page;
wherein said processing means is adapted
70 to accommodate said window so that it may
selectively access said memory means and
progress through said structure by accessing
an individual frame of a page at any one time,
via said logical links; and
75 wherein said structure is arranged such that
the main frame of a page is linked to a suc-
cessive page by a primary logical link and a
secondary frame of a page is linked to a com-
mon family of pages by a tertiary logical link.
80 2. A database system as claimed at claim
1, wherein a tertiary link from any of the
pages of said common family of pages may
be created by said processing means to any
of the pages of said structure upon a page of
85 said common family be accessed by said win-
dow.
3. A database system as claimed at claim
1 or 2, wherein said secondary frame of a
page which is linked to said common family of
90 pages is the next accessible frame after the
main frame.
4. A database system as claimed at any of
the preceding claims as dependent upon claim
2, wherein said common family of pages com-
95 prises a discrete hierarchical sub-structure of
pages within said structure, and being con-
nected thereto only by means of a primary
logical link between the root page of said sub-
structure and its parent, and tertiary logical
100 links as claimed at claim 2.
5. A database system as claimed at any of
claims 1 to 3, wherein said common family of
pages is arbitrarily disposed within said struc-
ture.
105 6. A database system substantially as de-
scribed herein with reference to the accom-
panying drawings mutatis mutandis.
7. A method of accessing a database sys-
tem as claimed at any of the preceding claims
110 using a terminal means to interact with said
processing means and which may generate
one of a plurality of commands to create said
window and a tertiary logical link, and access
said pages of said structure via said logical
115 links, said method comprising:
addressing a page of said structure with
said window by selecting an appropriate pri-
mary or tertiary logical linking command with
said terminal;
120 progressing said window to a secondary
frame of said selected page having a tertiary
logical link to said common family of pages by
selecting an appropriate secondary logical link-
ing command with said terminal;
125 progressing said window to a root page of
said common family by selecting an appropri-
ate tertiary logical linking command with said
terminal;
progressing said window to a particular
130 page of said family by selecting an appropriate

primary logical linking command with said terminal.

8. A method as claimed at claim 7, wherein said method includes addressing a
5 desired page of said structure directly by creating an appropriate tertiary logical link from a previously selected page of the family to the desired page using the page identifer code and tertiary logical linking command with
10 said terminal; wherein said page identifier code is provided on the selected page of said family.

9. A method of accessing a database system substantially as herein described with ref-
15 erence to the accompanying drawings mutatis mutandis.